

National Weather Service
Morristown TN

The Appalachian Spotter

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Winter Outlook - Dry and Mild

The 2002-2003 winter outlook for the southern Appalachian region calls for near-normal temperatures and below-normal precipitation. This year's outlook is based on the occurrence of moderate El Nino conditions over the eastern Pa-

cific Ocean. El Nino is an phenomenon that involves interaction between the ocean and atmosphere. Warmer-than-normal sea surface temperatures over the eastern Pacific Ocean create more

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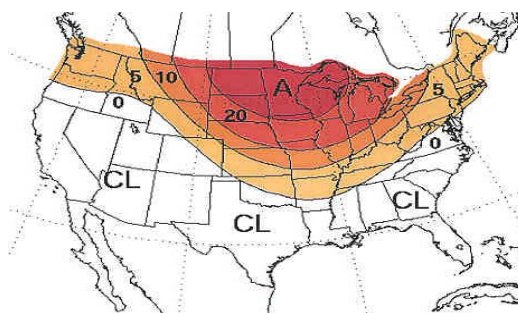


Figure 1. Temperature departure from normal for December, January, and February.

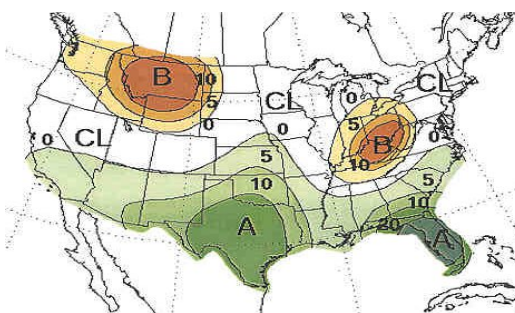


Figure 2. Precipitation departure from normal for December, January, and February.

Spotter training

What would a spotter newsletter be without a pitch for training. We recommend that spotters receive training at least every 2 years. If you need to schedule training for your group, or need training, contact Howard Waldron, WCM at (423) 586-8706, or howard.waldron@noaa.gov or check our training schedule at <http://www.srh.noaa.gov/mrx/classes.htm> for a class near you.

Special points of interest:

- * Winter Weather Awareness Week is November 19th-21st
- * Toll-free Spotter Number for Spotter Reports Only **1-800-697-0075**
- * General Weather Information Number **423-586-3771**
- * Spotter e-mail sr-mrx.spotter@noaa.gov
- * www.srh.noaa.gov/mrx/

Forecasting Frozen Precipitation Types

David Gaffin, Senior Forecaster

Forecasting the differences in frozen precipitation during the winter months can be very difficult, especially near the complex terrain of the southern Appalachian region. During the winter months, a wide variety of frozen precipitation can be expected, including snow, ice, sleet, and hail. So what causes the differences between these forms of frozen precipitation? The amount and location of cold

and warm air aloft creates the differences observed at the surface.

Most winter precipitation begins as snow high within the clouds that are below freezing (Figure 1). During a snowflake's descent to the surface, if the temperature of the air remains below freezing, the snowflake will reach the ground as snow. However, if this snowflake encounters a layer of air above freezing, it

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Up-Coming Fall Fire Weather Season

David Hotz, Senior Forecaster and Fire Weather Program Manager

As we approach the fall season with the brilliant display of autumn colors across east Tennessee, southwest Virginia, and southwest North Carolina, we also have the increased potential of wildfires. The driest months of the year are September and October, which leads us into this potentially dangerous fire season. Additionally, the falling leaves from the trees can act as a source of fuel for wildfire development, especially when the weather pattern remains dry with low humidities into November and December.



During the past couple of years, the fall fire weather season has been very active across the southern Appalachians with hundreds of acres of trees and brush fallen victim to fires. Since weather is one of the most significant factors in determining the severity of wildfires, one of the missions of the National Weather Service (NWS) at Morristown Tennessee is to provide weather support to area forestry agencies. We provide detailed forecasts of wind speed, humidity, tempera-

ture, transport winds, mixing heights, etc., to aid in containing the spread of forest fires.

An accurate weather forecast can mean life or death to a fire fighter and is also critical in protecting forest and range lands as well as the increasing number of homes in the wild-land/ urban interface. The NWS at Morristown works closely with the following agencies to provide wildfire support: Cherokee National Forest, Great Smoky Mountain National Park, Jefferson National Forest, Nantahala National Forest and Tennessee, Virginia, and North Carolina Divisions of Forestry.

"The driest months of the year...leads us into this potentially dangerous fire season."

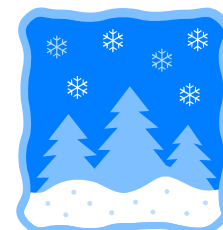
The fire suppression and wildfire support products can be found at the NWS Morristown Tennessee webpage: www.srh.noaa.gov/mrx/. Fire Weather Forecasts are issued daily each morning by 6 am Eastern Time and twice daily during fire season or upon request. Also, upon request, detailed site specific or localized forecast are provided to help contain wildfires or support prescribe burns.

Winter Outlook - Dry and Mild

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evaporation, and thus, more atmospheric moisture which gets transported across the southern half of the United States. The southern Appalachian region normally does not experience a direct effect from the El Nino phenomenon, although below-normal precipitation is typically observed across the Ohio Valley. Most previous El Nino events (8 out of 10) produced below-normal winter precipitation across east Tennessee, although the Carter County flash flood of January 1998 occurred during the strong 1997-1998 El Nino event.

As for temperatures, this El Nino phenomenon produces a stronger sub-tropical jet stream across the southern United States, which typically keeps arctic outbreaks of cold air to a minimum. Thus, the northern half of the United States usually experiences above-normal temperatures during an El Nino influenced winter. This doesn't mean that there won't be any arctic outbreaks of cold air, but they should be fewer and far between this winter.



Forecasting Frozen Precipitation Types

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will melt into a raindrop. This raindrop will refreeze as freezing rain if the surface air temperature is below freezing in a shallow layer. This freezing rain results in a layer of ice across roads and power lines, which usually proves to be the most dangerous and destructive form of winter precipitation. If the layer of air below freezing at the surface is deep enough, raindrops will refreeze as sleet before reaching the ground. Hail is formed, normally with thunderstorms, when a frozen

ences in frozen precipitation involves a process called evaporative cooling. When water evaporates, heat is needed to complete the transformation from a liquid to gaseous phase. In the atmosphere, rain will evaporate by taking heat from the surrounding air mass. If a layer of dry air is observed in the atmosphere, rain falling through this dry layer will evaporate until the air becomes saturated. This evaporation cools the surrounding air. The amount of cooling depends on the humidity



Figure 1. Vertical cross section of the atmosphere From *The Weather Book, USA Today*

raindrop is kept from falling out of the storm by strong updrafts. These updrafts cause the frozen raindrop to grow in size as it recycles through the rotating updrafts and downdrafts of the thunderstorm. The stronger the updraft of the thunderstorm, the larger the hailstone will likely grow.

Another complicating factor when forecasting the differ-

and depth of the dry air.

Forecasting whether enough evaporative cooling will be present to cause a layer of air to cool below freezing can be very difficult and tricky for local forecasters. This cooling process is important to forecast correctly, not only at the surface, but also throughout the entire depth of the atmosphere. A missed forecast of this cooling process at any layer of the atmosphere can be the difference between a rain, snow, freezing rain, or sleet event.

New Voices for NOAA Weather Radio

Derek Eisentrout, Hydrometeorological Technician and CRS Focal Point

You may have noticed a change to your NOAA weather radio broadcast recently. Over the past few months, the National Weather Service has transitioned to two new computer-generated voices. Donna and Craig are the names given to these synthesized voices that won out in a competition of overall voice quality and clarity. Our main challenge has been to teach the new voices how to

properly pronounce local geographic terms, such as the names of towns, creeks, roads, etc. This upgrade to more human-like voices coupled with months of diligent vocabulary work will prove to be a great asset as we head into the winter weather season.

If you notice a word or location that you feel is mispronounced, be sure and let us know, and we will try to correct it. If you could give the message context, it would help.

How can it flood in a drought?!

Brian Boyd, Service Hydrologist

We are in a drought. So say various agencies from local emergency managers to the United States Government. But some people have been flooded, and pretty seriously. What gives? What does "drought" mean? What is a flood? How can the two occur at the same time?

Let's take a quick look back at the worst long term drought in U.S. history, the Great Dust Bowl of the 1930s. Record heat and record low rainfall records still stand in many states from that decade, yet some record rains fell, too, during the Dust Bowl. A "drought" occurs when normal rainfall levels are not reached for a given time period. This can mean a very short, mild period of dry weather, or it can stretch into years, even decades. When the latter happens, it can actually change the "normal" rainfall values for a region.

When abnormally dry weather occurs in East Tennessee, extreme southwest Virginia and North Carolina, it can mean simply that in a normally wet month like March, a few less rain storms came our way. Perhaps, little snow fell in the winter and the topsoil became dry and no floods occurred. On the other hand, an abnormally dry October, normally the driest month anyway, can mean that some wells become poor producers, and that wild fires become more common. Perhaps a burn ban will be introduced.

In April 1998, record flooding occurred on many rivers and streams in the Upper Tennessee River basin. Remember when the water in Norris Lake overtopped the dam and all the flood gates had to be opened for only the second time in history? TVA masterfully let water through at a rate that saved the dam, yet avoided flooding the cities of Clinton and Oak Ridge. Over 8 inches of rain fall over the entire Tennessee River basin above Chattanooga. This means that if all the rain that fell in April 1998 above Chattanooga were gathered together at one time, it would cover the entire area 8 inches deep. This is more than twice the monthly average for the whole area.

Then by mid summer, someone turned off the faucet. While the first few weeks after April allowed us to clean up after the record flooding and get dried out, months of below normal rainfall began in August 1998, and then finally by October 2002, we are running a string of four years of below normal rainfall for most areas. There have been periods such as late last month where significant rains have fallen and given hope that the drought

was breaking. Some important things to remember are:

The ability of rain to replenish soil moisture locally and refill aquifers (underground water tables, etc.) is inversely proportional to the rainfall intensity. In other words, the more intense the rain the greater the surface runoff, and the smaller amount sinks into the ground and fills the aquifer. Too much runoff leads to flooding. During an extended severe drought, the sun and wind bake and dry out the topsoil until it becomes too hard to allow much rain to infiltrate. Hence, much of this water flows out of the area in which it falls. If there are no downstream reservoirs, it ends up in the ocean or a lake, and does not benefit the place on which it fell.

Another factor: only rainfall in the drainage area UPSTREAM of (above) a reservoir replenishes it. Rain on areas downstream of (below) the reservoir will only provide local, short term drought relief. If the main source of water supply is from upstream reservoirs, even significant local rain may not eliminate drought conditions. A typical situation is one where response to heavy local rain is mixed: some drought impacts are improved by the local precipitation (e.g., trees green up, crops improve, streams flow or even flood temporarily, fire danger lessens, etc.), while water supply problems remain because upstream reservoirs are still low, or because the deeper water table is not replenished by the heavy surface runoff and wells remain dry.

July 2002 was a great example of the kind of rains that can fool people in a drought into thinking that everything is getting better. Our office issued 40 flood warnings and statements during the month. But, 14 of those were issued during very heavy rains of July 1-4, and 14 were issued during the 22nd-24th. Thus, 28 or 70% of our warnings were issued during only 7 days of the month. The rest of the month had mainly little to no rainfall over the region. For those who can remember, July was also a very hot and muggy month, despite the inability of the atmosphere to wring this moisture out in the form of rain. For the 12 months ending in July, the three main NWS observing sites, Chattanooga, Knoxville, and Tri-Cities, had 9, 8, and 9 months, respectively with above average temperatures. Winter and spring were well above normal, which prevented much snow from falling. These warmer temperatures were the result of repeated "cold" fronts (which were not all that cold!) passing through the area. Ahead of the fronts, however, southerly and southwesterly winds increased dramatically. This above normal warmth and increased winds dried out the topsoil over large areas

and has contributed to the current drought situation. So, what's the bottom line? Take a look at these figures:

Reservoir basin	2000 dep from norm	2001 dep from norm	10/10/02 year to date dep from norm	Total dep from norm 2000 through 10/10/02	Deficit %
Norris	-11.01	-4.77	+0.96	-14.82	12
Boone	-8.74	-6.88	-6.49	-22.11	18
Watauga	-13.27	-9.27	-7.96	-30.22	23
South Holston	-8.47	-6.46	-3.99	-18.92	15
Cherokee	-8.02	-4.44	-1.23	-13.69	12
Douglas	-9.01	-5.75	-6.23	-20.99	16
Ft. Loudon/Tellico	-11.66	-6.25	+1.57	-16.34	12
Melton Hill	-11.66	-7.96	+3.90	-15.72	12
Watts Bar	-12.03	-16.95	+3.76	-25.22	17

As you can see, even though some reservoirs recovered this year a little so far, the overall long term rainfall deficit runs from 13.69 inches for Cherokee Lake to over 30 inches in the Watauga basin! This is from 12% to 23% short on rainfall just since 2000. The drought started in 1998. For more information and various looks at different parameters that go into determining drought status, visit the Drought Monitor at www.drought.unl.edu/dm/ and click on "Drought Monitor". A new map comes out once a week. If you have questions, please contact our Service Hydrologist, Brian Boyd at (423) 585-2296 or via email at brian.m.boyd@noaa.gov. Our hydrology website is at www.srh.noaa.gov/mrx/, then click on the "Lakes and Rivers" link.

Winter Safety

BE PREPARED...Before the Storm

- Have flashlight, extra batteries, NOAA Weather Radio, extra food and water, and emergency heating source and heating fuel available in your home.
- Have a *winter survival kit* in your vehicle including blankets, flashlight, first-aid kit, non-perishable food, extra clothes, sand or cat litter, and a shovel.

When Caught in a Winter Storm in a Vehicle

- Stay in your vehicle; run the motor ten minutes each hour for heat (open the window and clear exhaust pipes to avoid carbon monoxide poisoning); make yourself visible; exercise.

When Caught in a Winter Storm in a Building

- Stay inside; eat and drink to provide the body with energy; wear layers of loose-fitting warm clothing.

Frostbite is damage to body tissue caused by that tissue being frozen. Frostbite causes a loss of feeling and a white or pale appearance in extremities, such as finger, toes, ear lobes, or the tip of the nose. **Hypothermia** is the dangerous lowering of body temperature. Warning signs include uncontrollable shivering, memory loss, disorientation, drowsiness, and apparent exhaustion. For both cold related conditions, get medical help immediately!

Winter Reporting

Snow can be one of the simplest, and yet is generally one of the most misunderstood weather elements to observe. To correctly measure and report snow depth, you need to measure several locations in open exposed areas and average these measurements to get the accurate snow depth. If you want to get the greatest depth be sure that this is reported as a drift, not the snow depth. If you took a number of measurements and found the average to be 10 inches with the greatest 19 inches, report snow depth of 10 inches with drifts to 19 inches. Like we said, simple but easy to misunderstand

SNOW	1 INCH OR MORE PER 12 HOURS
SLEET OR FREEZING RAIN	WHEN TRAVEL BECOMES HAZARDOUS, REPORT ICE ACCUMULATION IF POSSIBLE
NON-CONVECTIVE HIGH WINDS	MEASURED OR ESTIMATED WINDS OVER 50 MPH, ANY DAMAGE CAUSED BY WIND
RAIN	1 INCH OF RAIN DURING AN EVENT
FLOODING	WHEN FLOODING THREATENS ROADS OR PROPERTY

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Message to Spotters

Jerry McDuffie, Meteorologist In Charge

We hope you have had a wonderful summer, even though it was mostly a dry one. Our usual dry months of September and October have blessed us with some very needed rain of late. The cool air has begun to infiltrate the region and there is a definite feel of Fall in the air. The leaves are changing colors while some are already falling. But, I am sure, that as "Spotters" and residents of this beautiful State, you already know that.

As the fall turns to winter, cold air moves in and on occasion, provides us with some of the elements that are of concern in this pamphlet. Most likely we will see some snow, freezing rain, sleet, and most assuredly rain, strong winds, and cold temperatures. Our wettest months are March, December and January. The months in which we receive the most snow are January and February followed by December. The coldest month is January followed almost equally by February and December. However, we have all been around Tennessee, southwestern Virginia or extreme southwestern North Carolina long enough to know that winter weather can strike in November, March or even October or April.

As has been mentioned in other articles within this pamphlet, it is very difficult to correctly and completely assess the atmosphere at all levels, which makes forecasting the occurrence of snow, rain, sleet or freezing rain an extremely difficult process. Thus, we rely heavily upon you folks out there who become extra eyes and ears to let us know what is happening. It is very important to us to know that 2 inches of snow has fallen at your location, or that the wind is blowing the snow around with temperatures in the 20s or teens. It is very significant information for us that 6 or 10 inches are on the ground and snow is still falling or that it has stopped. To be informed that freezing rain has begun or has changed to rain or snow, is very helpful.

You folks who live in the higher elevations provide information that we usually do not get from any other source. All of this is extremely important and gives us a big advantage in forecasting what else is to come. We greatly appreciate your help. If you have any questions, please give us a call. The phone numbers and email address are the front page. A big THANKS to all of you.

Jerry